48

$$\frac{1000e^{-4x}}{1000} = \frac{75}{1000}$$

$1000 \cdot e$^$(-4 \cdot 0.6476)$

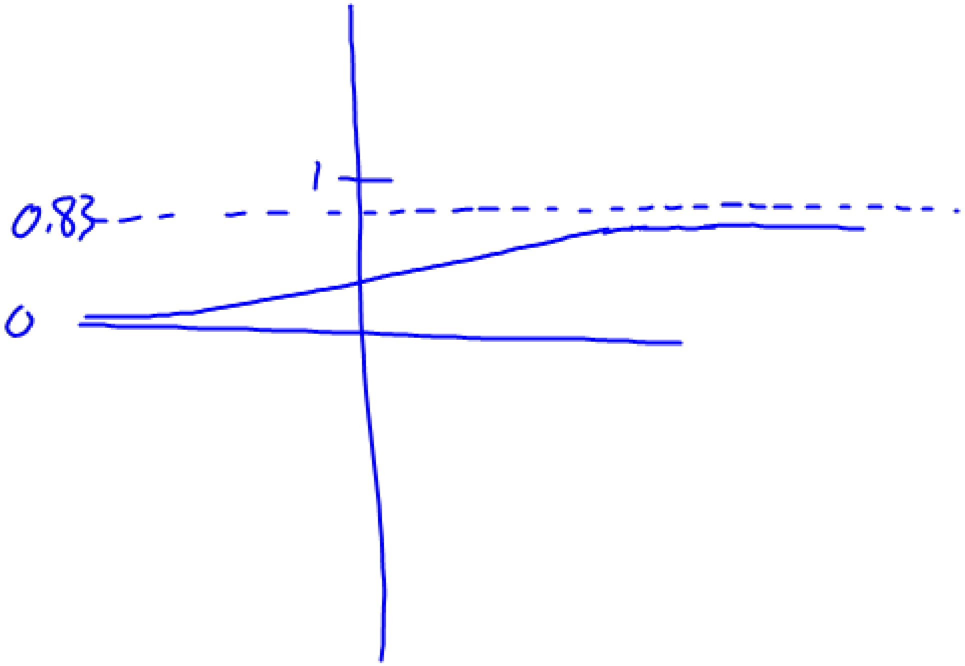
$$\ln e^{-4x} = \ln 0.075$$

$$\frac{-4x}{-4} = \frac{\ln(0.075)}{-4}$$

$$x \approx 0.6476$$

116

$$P = \frac{0.83}{1+e^{-0.2n}}$$



$$0.6 = \frac{0.83}{\cancel{1+e^{-0.2n}}} \cdot \cancel{(1+e^{-0.2n})}$$

$$\frac{0.6(1+e^{-0.2n})}{0.6} = \frac{0.83}{0.6}$$

$$1+e^{-0.2n} = 1.383$$
$$-1 \qquad -1$$

$$e^{-0.2n} = 0.383$$
$$\ln \qquad \ln$$

$$-0.2n = -0.959$$

$$n = 4.799 \text{ trials} \approx 5$$

51

$$5^{-\frac{t}{2}} = 0.2$$

$$-\frac{t}{2} = \frac{\log 0.2}{\log 5}$$

$$-\frac{t}{2} = -1$$

$$\boxed{t = 2}$$

89

$$\ln(x+5) = \ln(x-1) - \ln(x+1)$$

$$\ln\left(\underline{x+5}\right) = \ln\left(\underline{\frac{x-1}{x+1}}\right)$$ one-to-one

$$(x+1)(x+5) = \frac{x-1}{\cancel{x+1}} \cdot \cancel{x+1}$$

$$x^2 + 6x + 5 = x - 1$$

$$-x \quad +1 \quad -x \quad +1$$

$$x^2 + 5x + 6 = 0$$

$$(x+2)(x+3) = 0$$

$$\boxed{x = \cancel{-2}, \cancel{-3}}$$ extraneous

(85)

$$\ln_e (x+1)^2 = 2$$

$$\frac{-2 \pm \sqrt{4-4(1)(-6.389)}}{2}$$

$$e^2 = (x+1)^2 \quad \sqrt{\ } \qquad \pm e = x+1$$

$$x = e-1 \qquad \approx 1.718$$

$$-e-1 \qquad -3.718$$

$$\cancel{e^2 = x^2 + 2x + 1}$$

$$\cancel{-e^2 \qquad -e^2}$$

$$\cancel{0 = x^2 + 2x - 6.389}$$

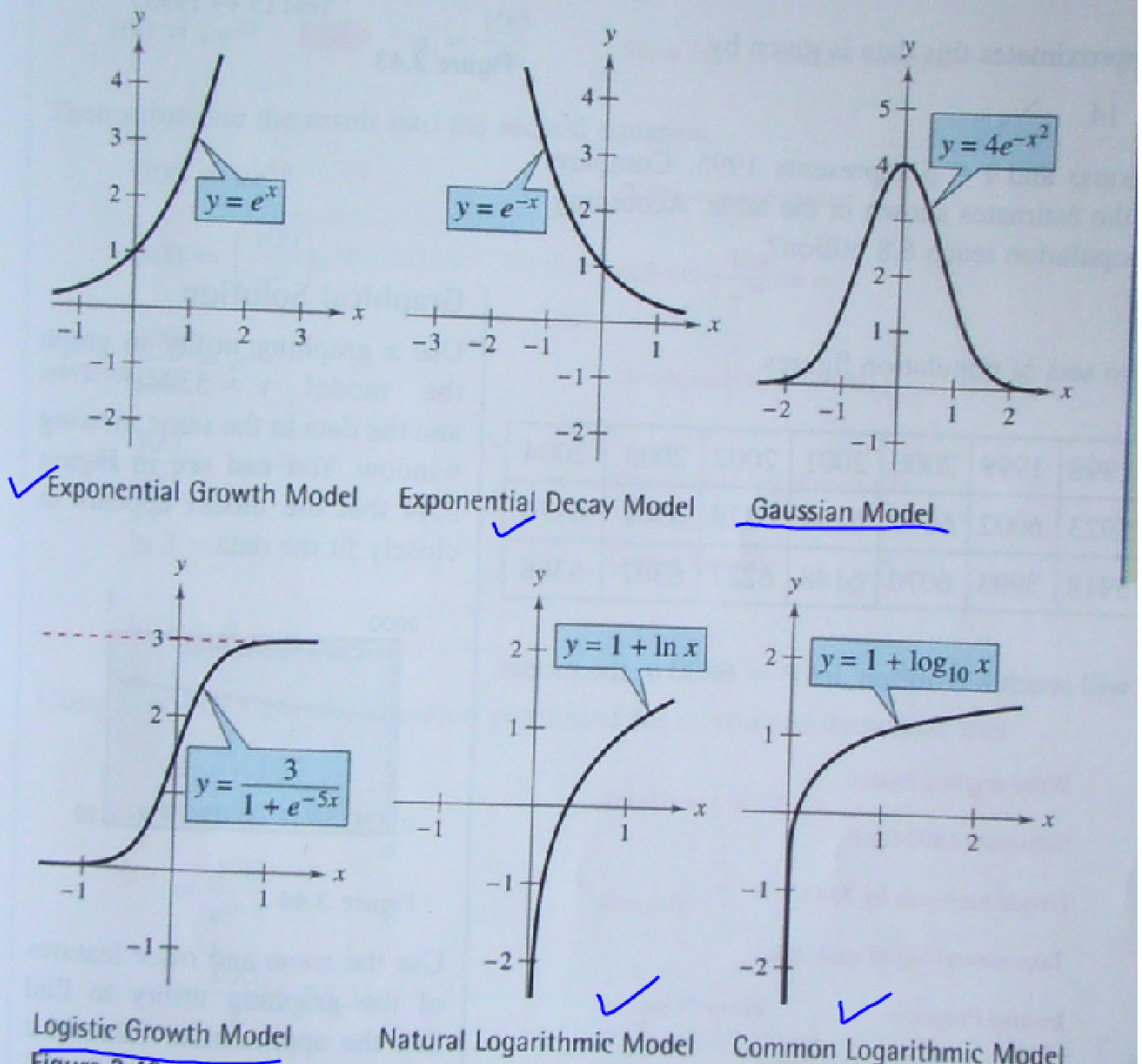
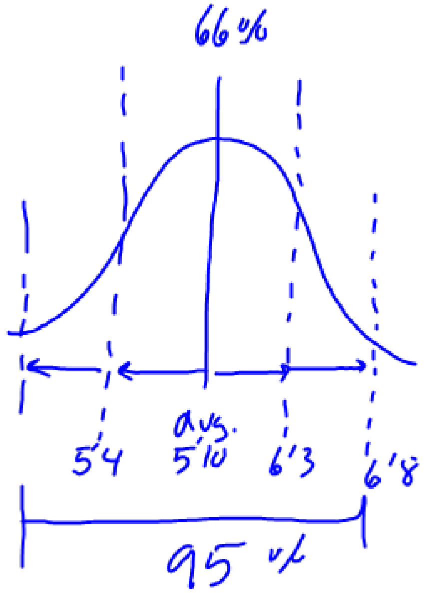


Figure 3.42



1. **Exponential growth model:** $y = ae^{bx}, \quad b > 0$
2. **Exponential decay model:** $y = ae^{-bx}, \quad b > 0$
3. **Gaussian model:** $y = ae^{-(x-b)^2/c}$
4. **Logistic growth model:** $y = \dfrac{a}{1 + be^{-rx}}$
5. **Logarithmic models:** $y = a + b \ln x, \quad y = a + b \log_{10} x$

Exponential Equation through two points

$(1,1)\ (4,8)$

$y = ab^x$

1. $y = ab^3$
2. $y = 1b^3$
3. $8 = 1b^3$
4. $b = 2$
5. $8 = a2^4$

$8 = 16a$

$a = \frac{1}{2}$

Steps

1. Take difference of the x-values will be the x in $y = ab^x$
2. Take y-value of 1st point that is your a-term temporarily
3. Take y of 2nd point for the y-value
4. Solve for b
5. Plug in the either point for x and y and the b you just found, solve for a
6. write final equation

$$y = \frac{1}{2}(2)^x$$

Sect. 3.5

#1-6, 23, 26, 29, 39, 53, 54